

Current

Numerical Weather Prediction

Models

Objective

- **Given access to meteorological data, interpret numerical weather prediction products IAW an evaluation checklist.
Meas: PC/W**

Fleet Numerical Meteorology & Oceanography Center

(FNMOC)

FNMOC's Models

NOGAPS

COAMPS

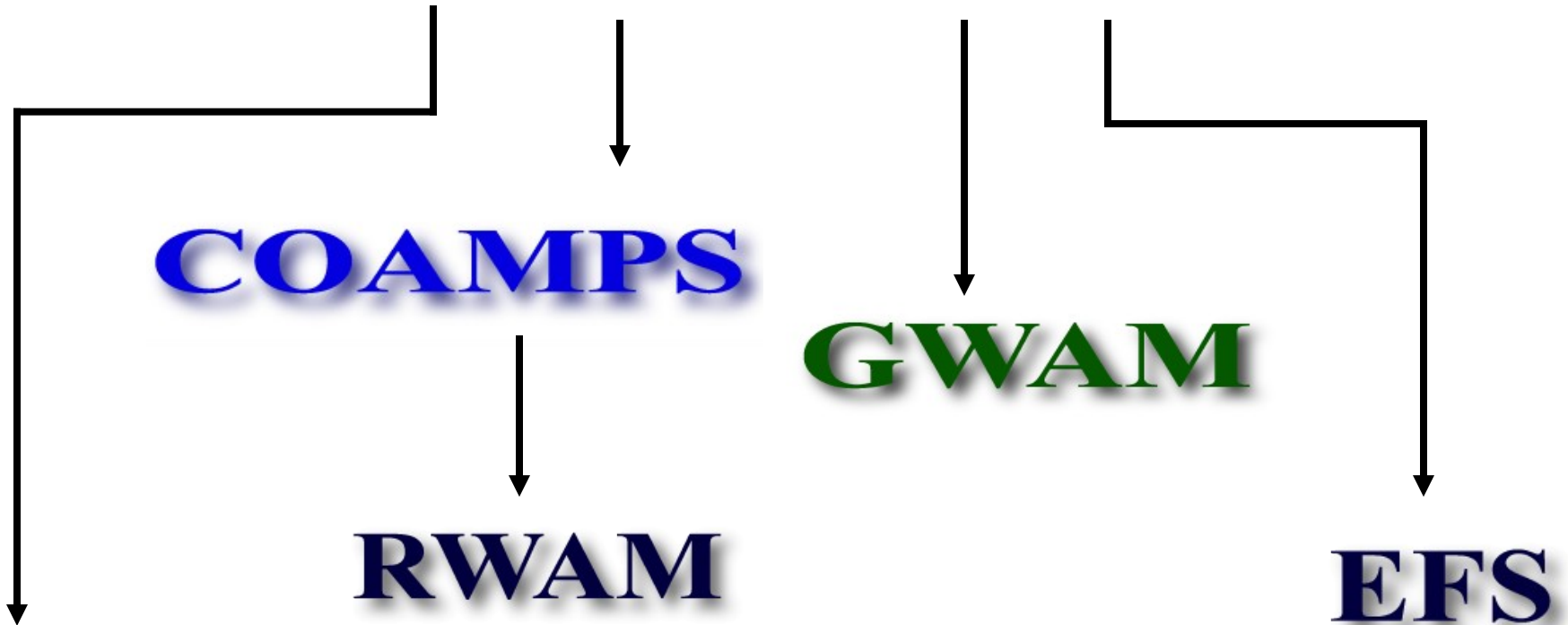
GWAM

RWAM

EFS

AFWA MM5

STAF C



NOGAPS

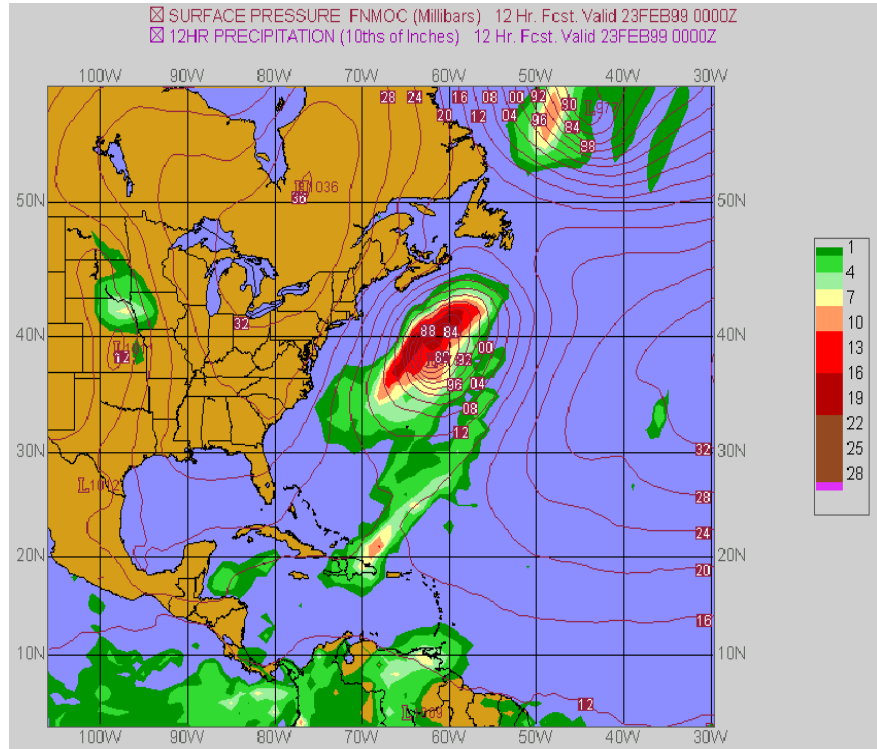
NOGAPS

Global

- **Domain:**
 - Global
- **Model Type:**
 - Spectral
- **Basic equations:**
 - Primitive equations with hydrostatic approximation
- **Horizontal Resolution:**
 - T159 (~0.75 degree)

More

NOGAPS Example



- **Vertical Coordinate System:**
 - Hybrid Sigma - p (pressure)
- **Vertical Resolution:**
 - 24 sigma levels with approximately 6 sigma levels below 850 mb, depending on terrain elevation.
- **First-guess fields**
 - Previous NOGAPS 6-h or 12-h forecast
- **Forecast time**
 - 144 h from the 00-UTC and 12-UTC operational runs, time step of 540 secs

GWAM

Global

North Atlantic

South Atlantic

North Pacific

South Pacific

Indian Ocean

Example

- The Global WAM is driven by the wind stress fields of the NOGAPS model
- If NOGAPS has a problem it will usually be reflected in GWAM

Ensemble Forecast System (EFS)

EFS

Global

South Hemisphere

Northern Hemisphere

Southwest Australia

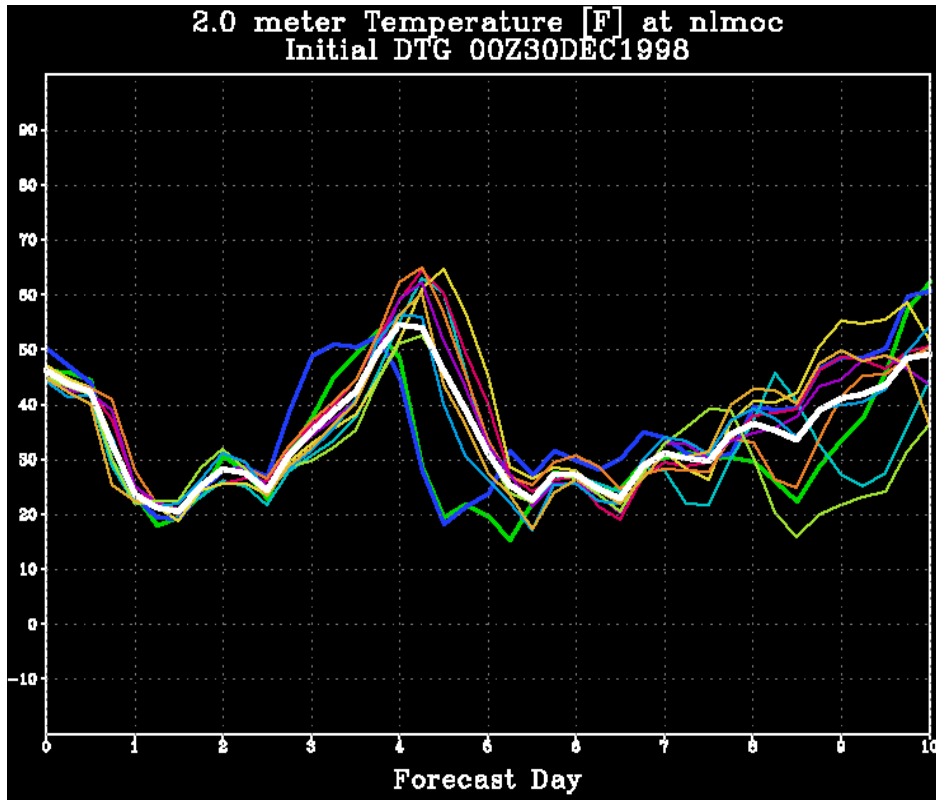
North Atlantic Basin

Northern India Ocean

Example

- The members include: the operational NOGAPS T159
- At day 6 (TAU=144), the T159 members are truncated to T63 spectral resolution.

Ensemble Forecast System NLMOC Example



- Colored lines: time series of individual members' temperature forecasts
- White line: ensemble mean temperature forecast

FNMO C COAMPS

COAMPS

Korea

Conus

Europe

SW Asia

Cent Am

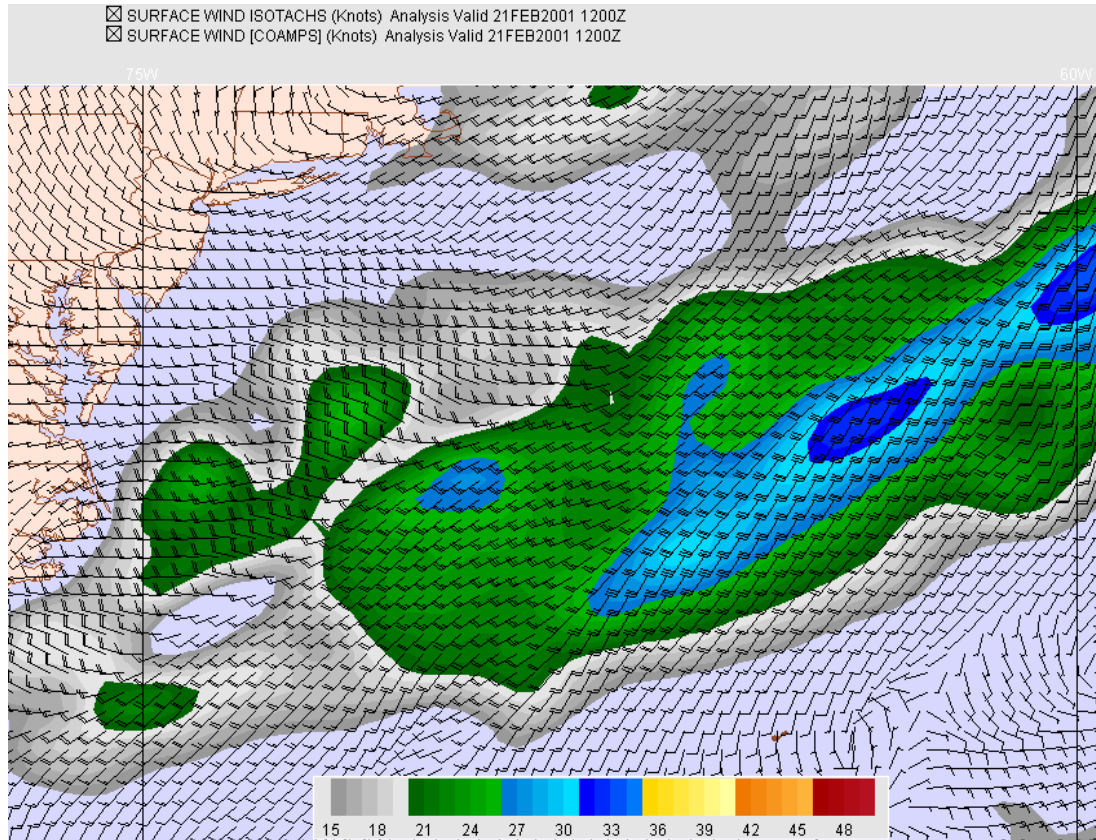
W-Atlantic

West Pacific

- **Domain:**
 - Regional
- **Model Type:**
 - Grid Point
- **Basic equations:**
 - Primitive equations with non-hydrostatic approximation
- **Horizontal Resolution:**
 - 27km & 9km

FNMOCCOAMPS

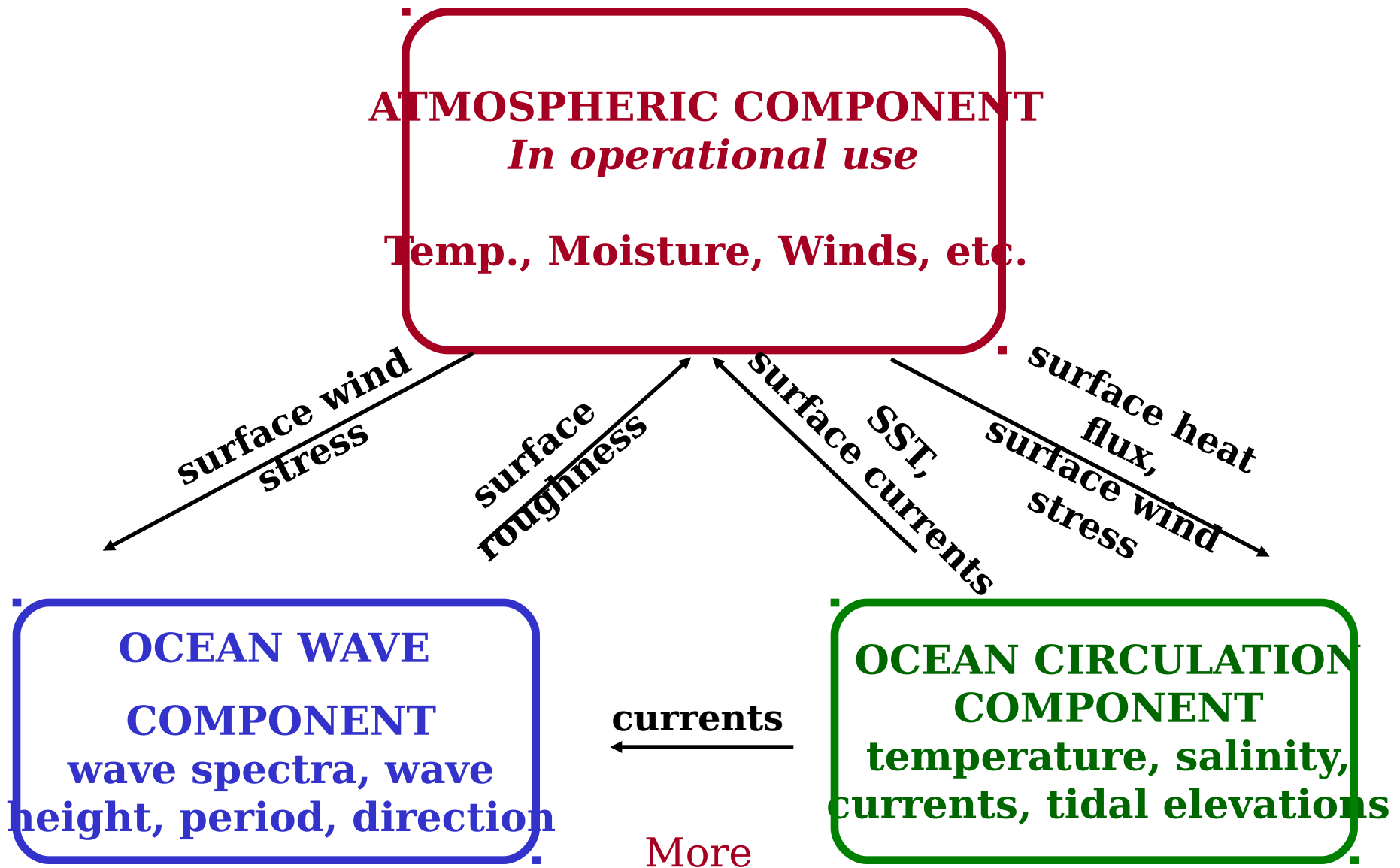
Continued



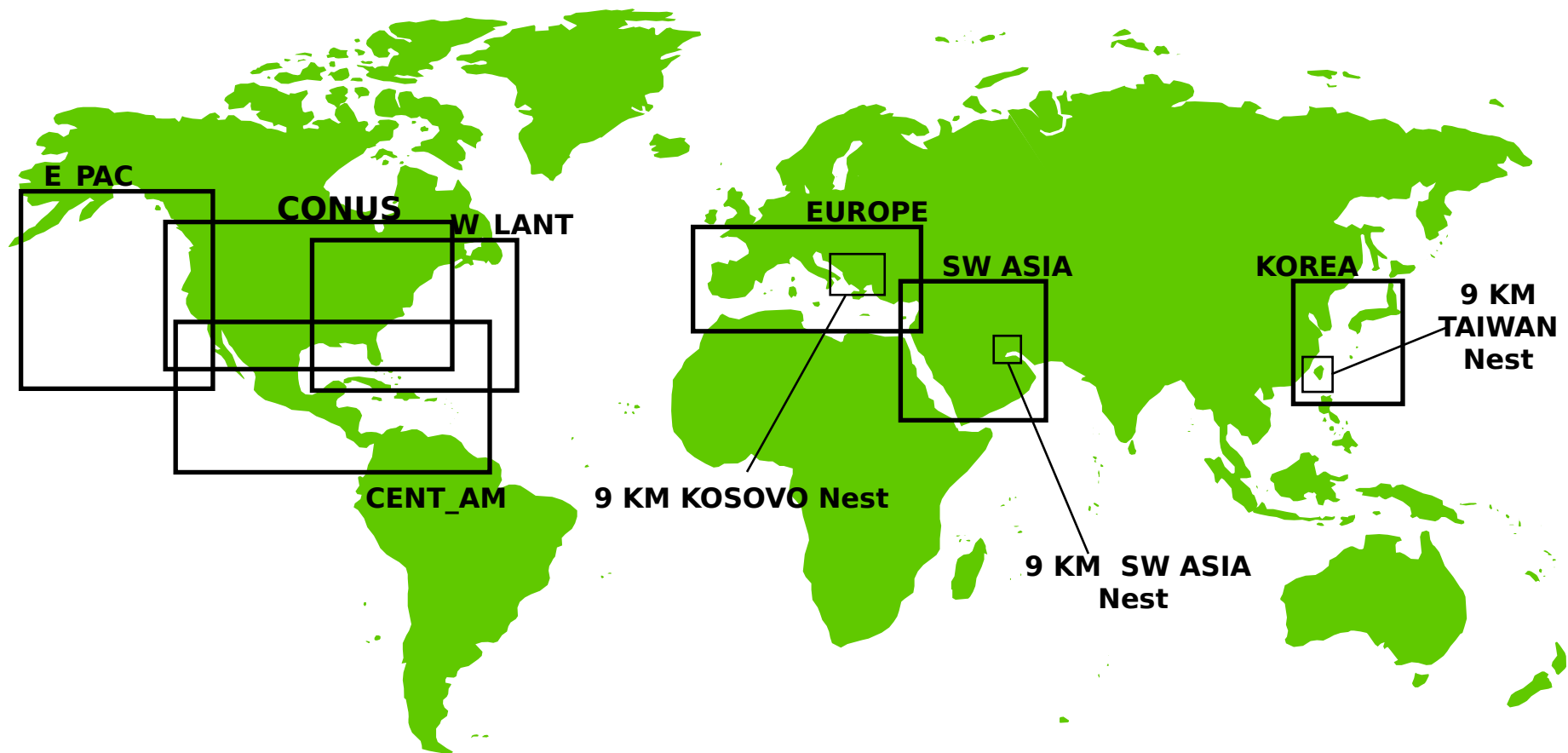
More

- **Vertical Coordinate System:**
 - (Hybrid) Sigma - z (pressure) -- Terrain following
- **Vertical Resolution:**
 - 30 Levels
- **First-guess fields**
 - It runs in a continuous update cycle, the first-guess fields come from the previous COAMPS forecast
- **Forecast time**
 - Nominally 48 h (72 for European Area)

COAMPS Architecture



Current COAMPS Coverage



 **COAMPS 27 KM / 9 KM**

[More](#)

Current COAMPS Coverage

FNMOC ME

COAMPS RWAM

RWAM

Med

Korea

Europe

SW Asia

Cent Am

W-Atlantic

Example

- Same locations as COAMPS areas
- Driven by the 10 meter wind fields of COAMPS
- Tendencies that apply to COAMPS apply to RWAM

AFWA MM5

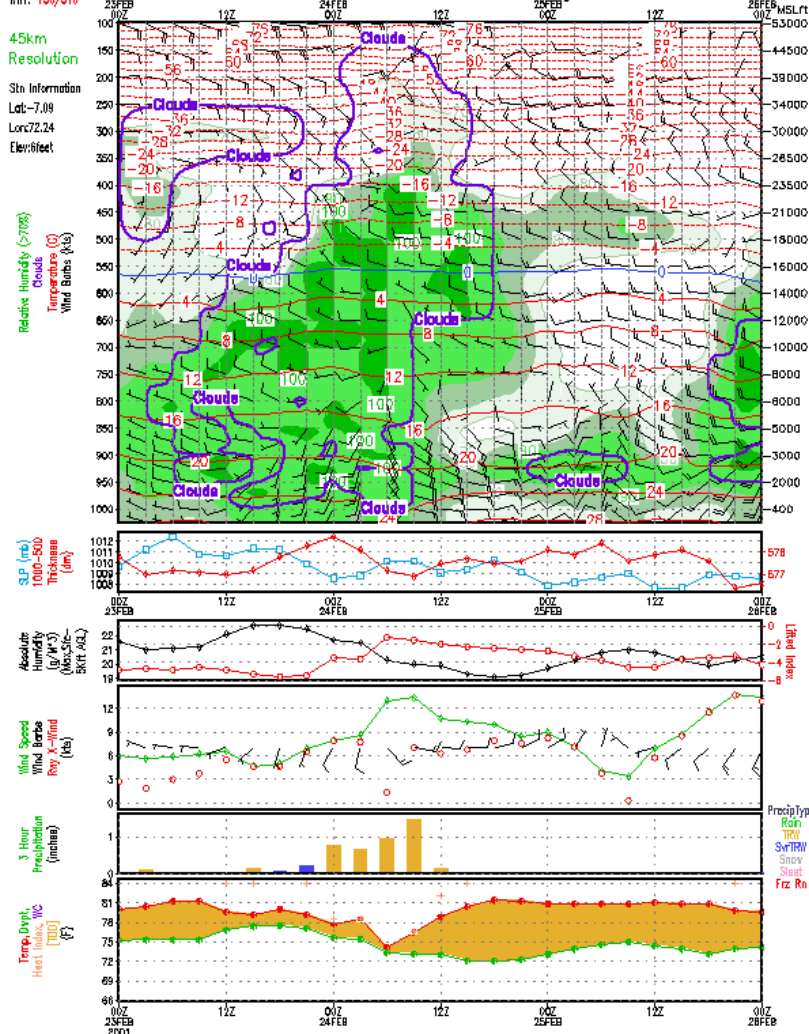
Diego Garcia, BIOT

RWY: 130/310

45km
Resolution

Sta Information
Lat:-7.09
Long:72.24
Elev:6feet

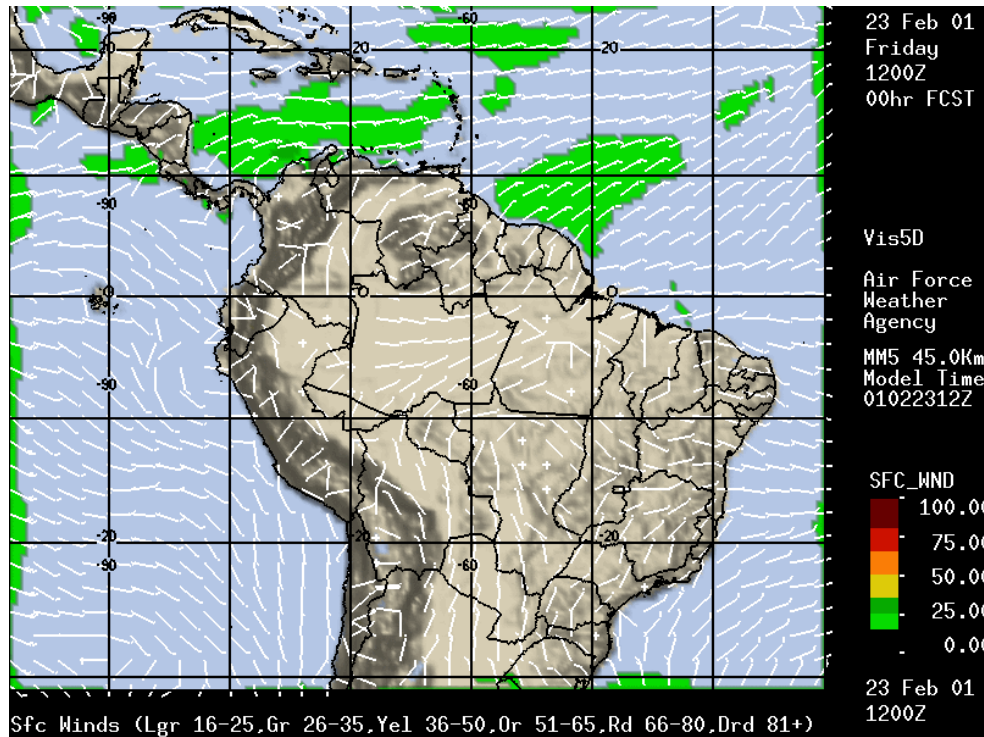
AFWA Forecast Meteogram
MM5 Model Cycle: 23FEB2001 00Z



- **Domain:**
 - Regional
- **Model Type:**
 - Grid Point
- **Basic equations:**
 - Primitive equations with non-hydrostatic
- **Horizontal Resolution:**
 - 45km , 15km, & 5 km

More

AFWA MM5 Continued



- **Vertical Coordinate System:**
 - Sigma-z
- **Vertical Resolution:**
 - 41 layers
- **First-guess fields**
 - Previous **NOGAPS** or **AVN** forecast (Area Dependent)
- **Output Time**
 - 3hr output some 1 hour

**National Center for
Environmental Prediction**
(NCEP)

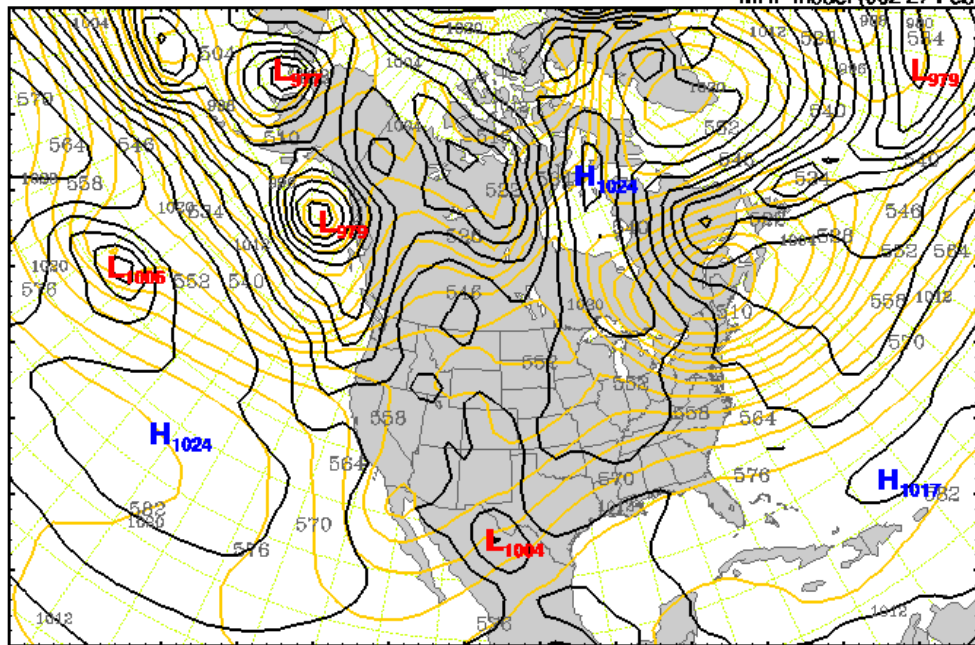
AVN/MRF

AVN & MRF Global

- **Domain:**
 - Global
- **Model Type:**
 - Spectral
- **Basic equations:**
 - Primitive equations with hydrostatic approximation
- **Horizontal Resolution:**
 - T170 (~0.80 degree)

AVN/MRF Example

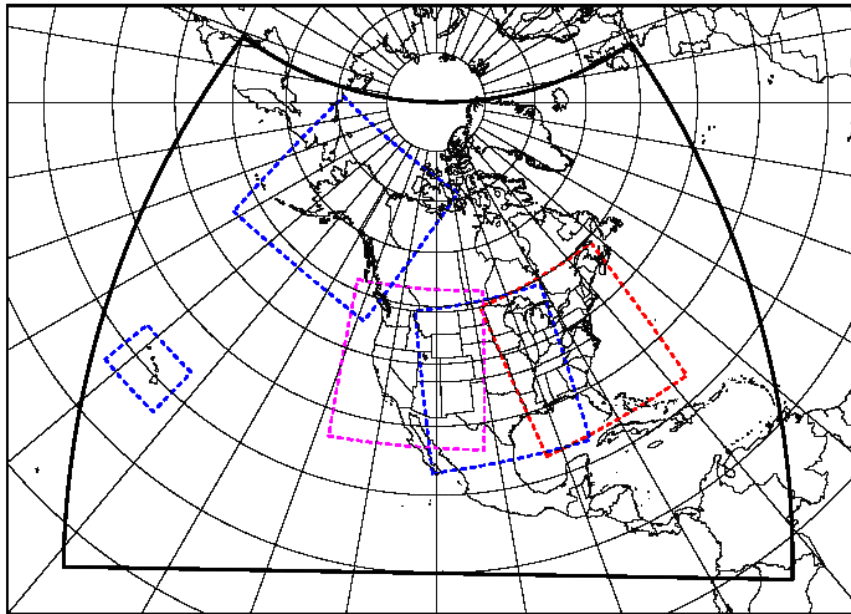
MSLP (mb)/500 mb Heights (dm)



72-Hour forecast valid 0000 UTC Fri 02 Mar 2001

- **Vertical Coordinate System:**
 - Sigma, terrain following coordinate system
- **Vertical Resolution:**
 - 42 unequally-spaced sigma levels
- **First-guess fields**
 - Uses statistical analysis
 - Not a previous forecast
- **Forecast time**
- **AVN - T+72hrs**
- **MRF - T72-240hrs (7Days)**

NCEP - ETA

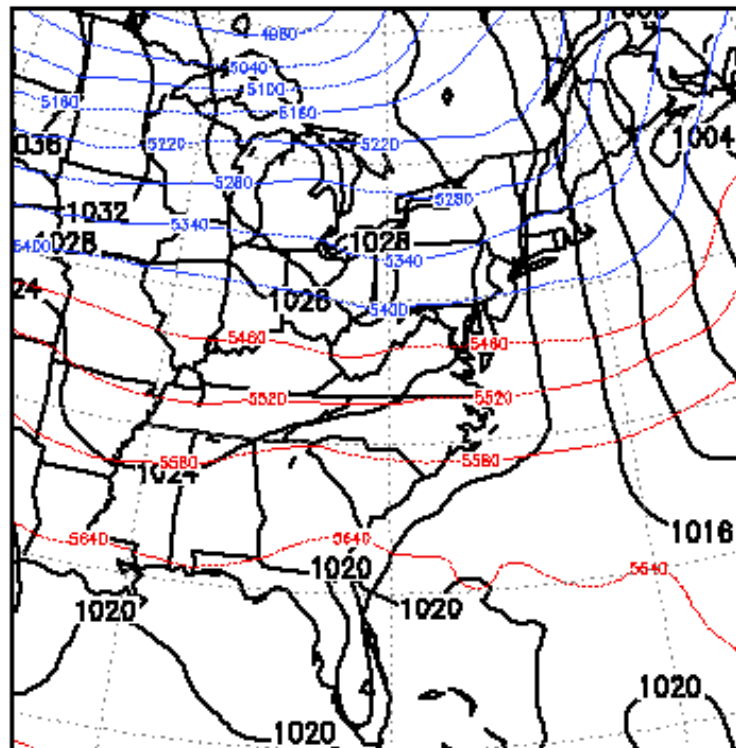


Nested Meso Eta-10 Domains

- **Domain:**
 - Regional
- **Model Type:**
 - Grid point
- **Basic equations:**
 - hydrostatic
- **Horizontal Resolution:**
 - ETA 22km
 - MESO ETA

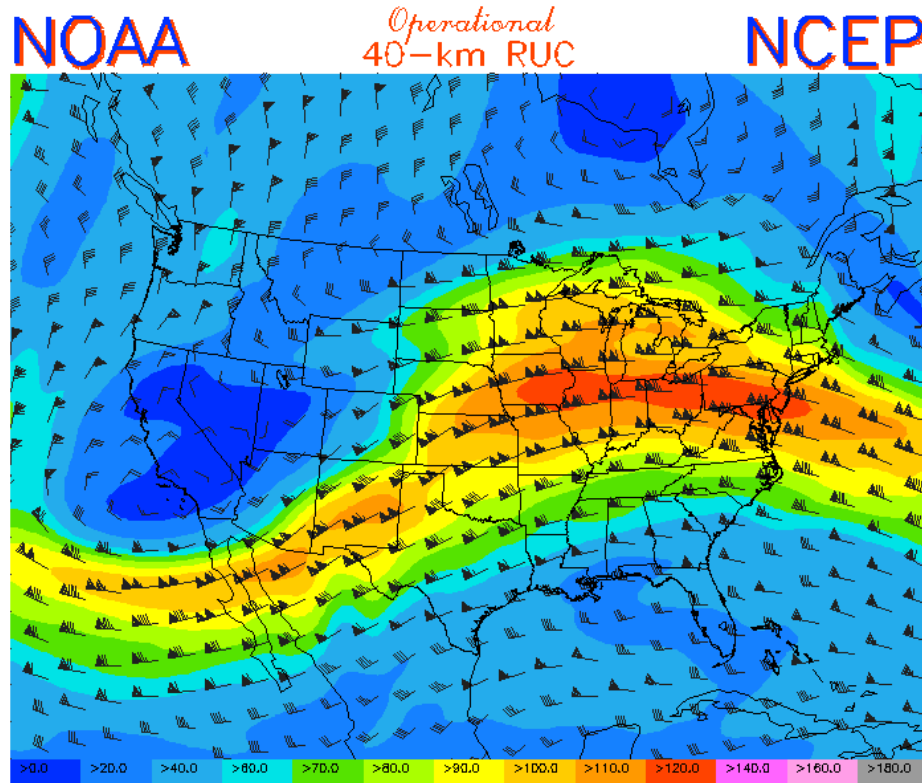
NCEP - ETA Example

SLP ETA 00H FCST VALID 00Z 27 FEB 2001



- **Vertical Coordinate System:**
 - Eta
 - Named after it!
 - Good around steep mountains
- **Vertical Resolution:**
 - 50 Levels
- **First-guess fields**
 - Global Data Assimilation System (GDAS)
 - ETA optimal interpolation (OI)
- **Forecast time**
 - T+60hr

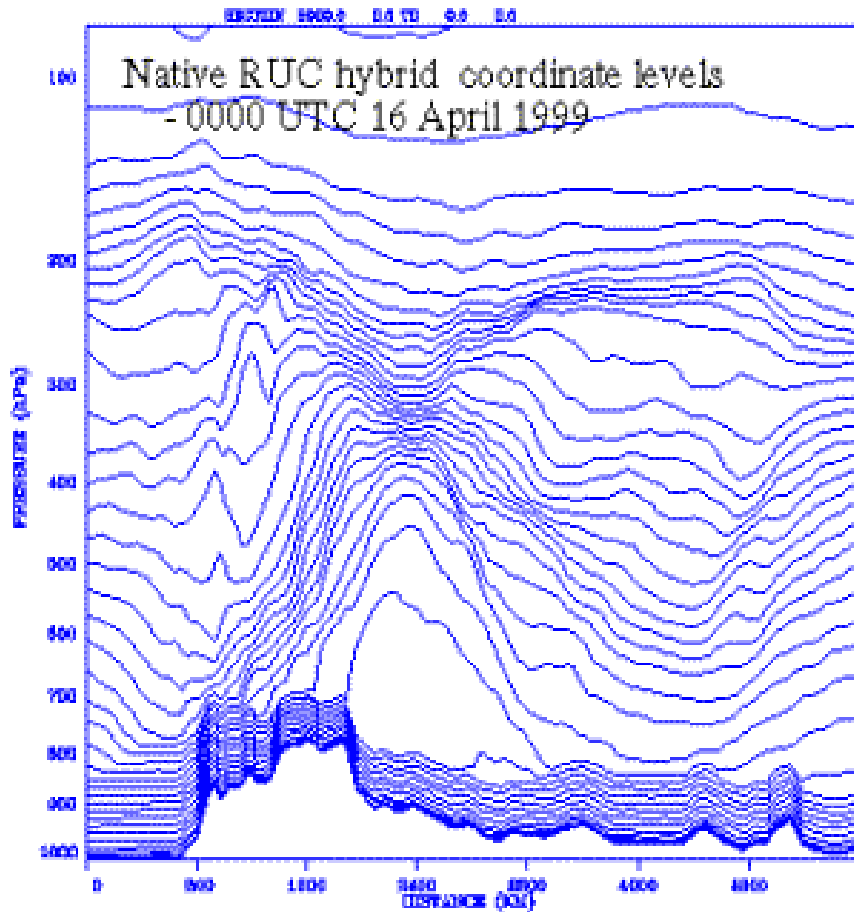
NCEP -- Rapid Update Cycle (RUC)



- **Domain:**
 - Regional
- **Model Type:**
 - Grid Point
- **Basic equations:**
 - Non-hydrostatic
- **Horizontal Resolution:**
 - 40km

NCEP -- RUC

Example



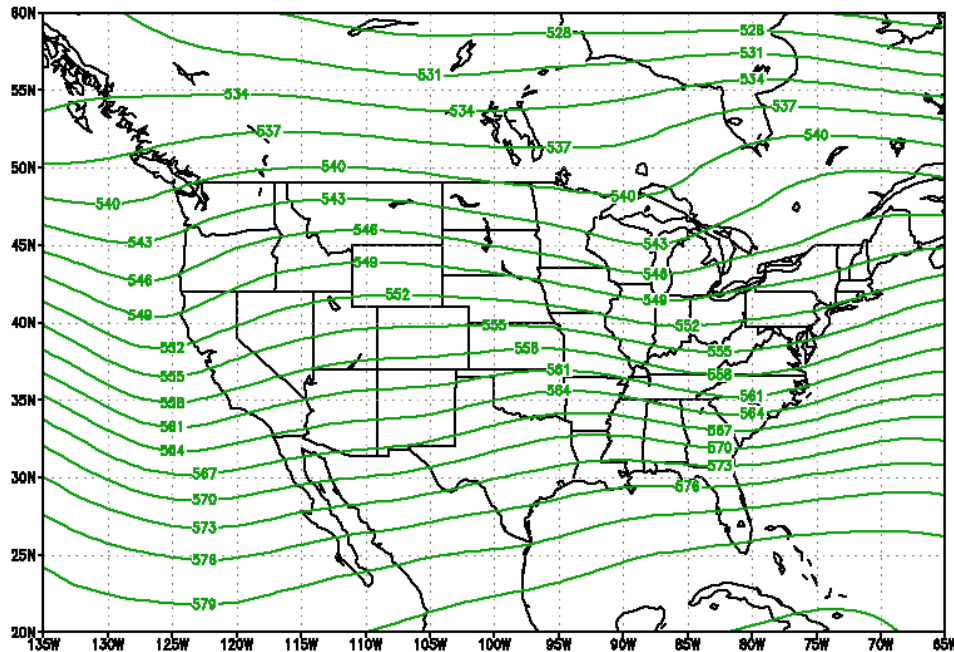
- **Vertical Coordinate System:**
 - Hybrid Isentropic-Sigma
 - Makes it more accurate around jet stream, fronts, etc...
- **Vertical Resolution:**
 - 40 layers
- **First-guess fields**
- **Forecast time**
 - T+12hrs

NCEP ENS Ensemble

- Eleven members of the AVN T170, and numerous others from the MRF.
- T+384HR – 16 days

ENS Example

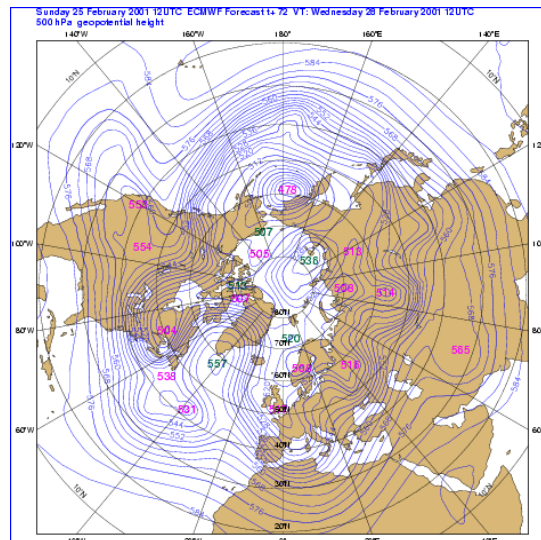
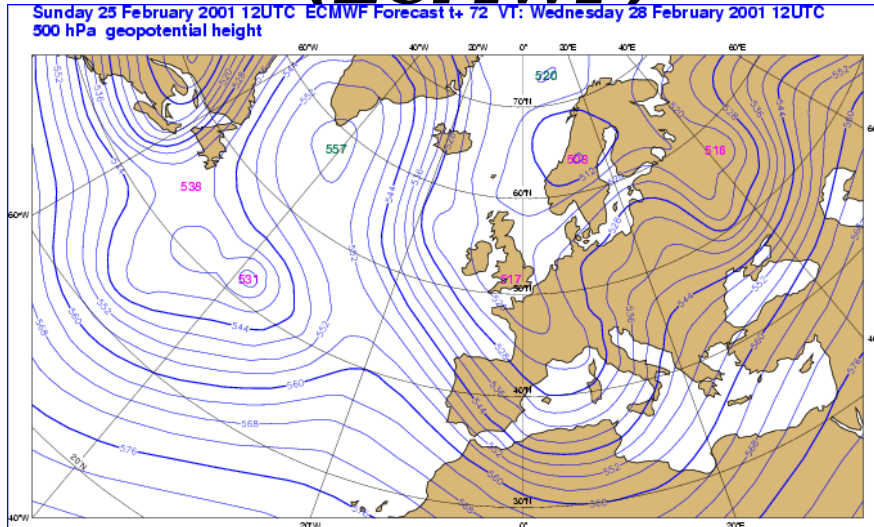
ENS 384HR MEAN 500MB HGT FCST VALID 00Z 16-MAR-2001



- Available products include:
 1. **500hPa Spaghetti Plots**
 2. **Mean SLP/1000:500mb Thickness**
 3. **850 Temp Mean Anomaly**
 4. **850 Temp Anomaly Probability**

**European Center for
Medium Range Weather Forecasting**
(ECMWF)

European Center for Medium Range Weather Forecasting (ECMWF)

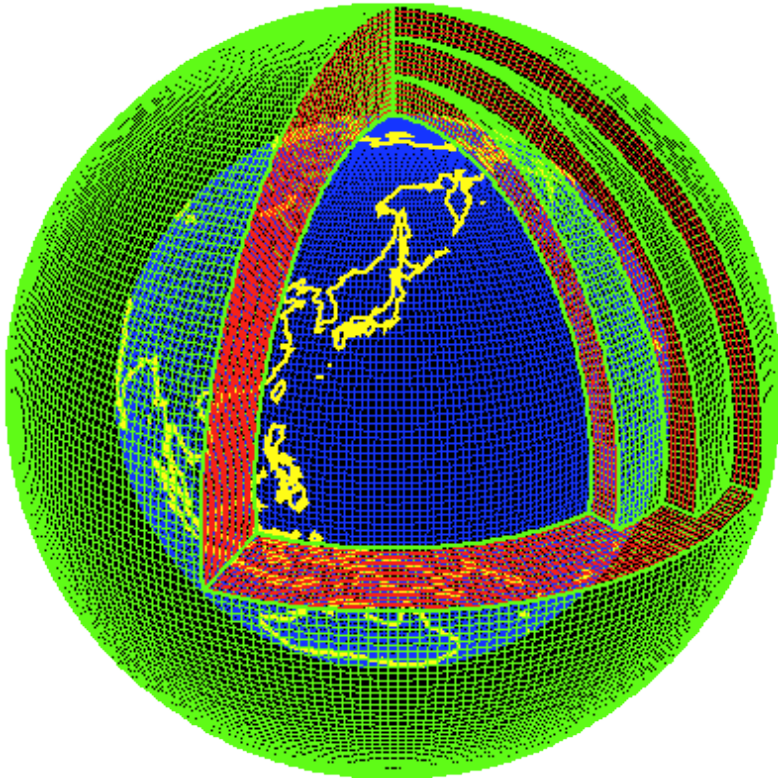


- **Domain:**
 - Global
- **Basic equations:**
 - Non-hydrostatic
- **Horizontal Resolution:**
 - 40km
- **Vertical Resolution:**
 - 63 levels
- **Forecast time**
 - T+168h (7 Days)

Japanese Meteorological Agency

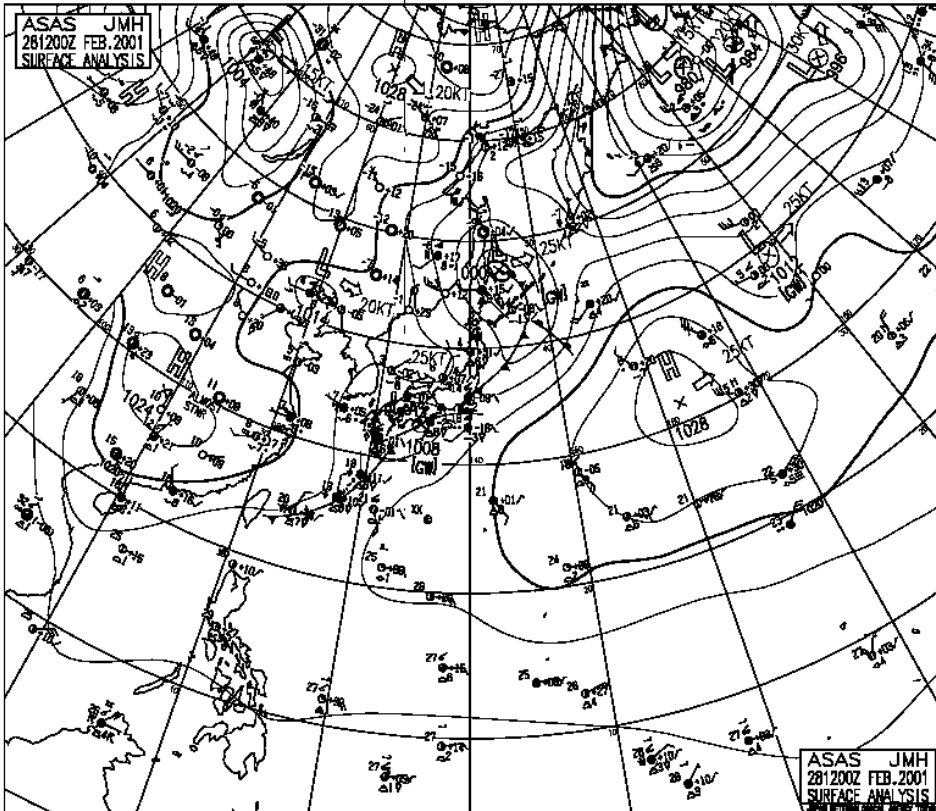
(JMA)

JMA Global



- **Domain:**
 - Global
- **Model Type:**
 - Spectral
- **Basic equations:**
 - Primitive equations with hydrostatic approximation
- **Horizontal Resolution:**
 - T ? (~ 0.56 degree)

Global JMA Example



- **Vertical Coordinate System:**
- **Vertical Resolution:**
 - 30 Levels up to 10hpa
- **First-guess fields**
 - Global Analysis
- **Forecast time**
 - 84h (00-UTC)
 - 192h(12-UTC)